

# Generative power of CD grammar systems with scattered context components

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Scattered context grammars (SCGs for short) are type of controlled grammars, that are based on context free grammars (CFGs). Each rule of the SCG consists of tuple of CFG-type rules. During each derivation step, each rule from the tuple must be applied on the current sentential form at the same time. It could be shown [1] that the generative power of scattered context grammars is greater than the generative power of context free grammars. It is also known, that the family of languages generated by SCGs without  $\varepsilon$ -rules (this family is denoted as  $SCAT^{-\varepsilon}$ ) is subset of the family of context sensitive languages. There is, however, long time open problem dealing with the possible identity of family of context sensitive languages and  $SCAT^{-\varepsilon}$ .

Modification of this problem will be presented. This modification is based on cooperating distributed (CD) grammar systems. CD grammar systems consist of set of grammars, called components. These components are sequentially activated, use some of their rules to rewrite part of the sentential form, are deactivated and new component continues with the rewriting. Using the modified variant of the problem, it will be shown that the family of languages generated by the CD grammar systems with two SCG components without  $\varepsilon$ -rules is same as the family of context sensitive languages. This will be shown by presenting an algorithm, which for any context sensitive grammar creates CD grammar system with SCG components, which generates the same language as the input context sensitive grammar.

## References

- [1] A. Meduna and P. Zemek. *Regulated Grammars and Automata*. Springer New York, 2014.